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UEDIT--A Full-Scale, Scrollable APL2 Spreadsheet
Input/Output Editor

Peter A. W. Lewis
and
Uwe H. Steinfeld

April 1990

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Prepared for:
Chief of Naval Research
Arlington, VA

90 06 12 11

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REPORT DOCUMENTATION PAGE

1a Report Security Classification Unclassified		1b Restrictive Markings	
2a Security Classification Authority		3 Distribution Availability of Report	
2b Declassification/Downgrading Schedule		Approved for public release; distribution is unlimited.	
4 Performing Organization Report Number(s) NPS55-90-08		5 Monitoring Organization Report Number(s)	
6a Name of Performing Organization Naval Postgraduate School	6b Office Symbol (If Applicable) OR	7a Name of Monitoring Organization Chief of Naval Research	
6c Address (city, state, and ZIP code) Monterey, CA 93943-5000		7b Address (city, state, and ZIP code) Arlington, VA	
8a Name of Funding/Sponsoring Organization Naval Postgraduate School	8b Office Symbol (If Applicable)	9 Procurement Instrument Identification Number O&MN, Direct Funding	
8c Address (city, state, and ZIP code)		10 Source of Funding Numbers	
		Program Element Number	Project No Task No Work Unit Accession No
11 Title (Include Security Classification) UEDIT-A Full-Screen, Scrollable APL2 Spreadsheet Input/Output Editor			
12 Personal Author(s) Peter A. W. Lewis and Uwe H. Steinfeld			
13a Type of Report Technical	13b Time Covered From To	14 Date of Report (year, month, day) 1990, April	15 Page Count 33
16 Supplementary Notation The views expressed in this paper are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
17 Cosati Codes		18 Subject Terms (continue on reverse if necessary and identify by block number)	
Field	Group Subgroup	Spreadsheet, APL2 spreadsheet, APL functions, frequency tabulations, cross-tabulations, draftsmans plots	
19 Abstract (continue on reverse if necessary and identify by block number)			
<p>A full-screen, scrollable spreadsheet-like editor written in the APL2 language is described for inputting, examining and outputting data. Mixed numeric and character arrays can be read into or read out to formatted DOS files (ASCII) or comma delimited DOS files. Alternatively a bulk mode input facility allows for rapid direct data entry, or data can be examined and edited cell-by-cell in the usual way. Columns, rows or blocks of data can be highlighted in a chosen color, shadowed, moved or copied. In addition APL functions entered on the command line can use the blocks as input or output. A facility for coding missing values is also provided.</p> <p>Major-to-minor (lexicographic) sorts can be performed on selected columns, and conditional or unconditional frequency tabulations and cross-tabulations of selected columns can be performed. Output is obtained as a new spreadsheet, or equivalently, as an APL2 matrix. In particular, two-way cross-tabulations of multiple columns are laid out in the spreadsheet like draftsmans plots to facilitate investigation and explanation of multivariate categorical data. No numerical coding of the data is needed.</p>			
20 Distribution/Availability of Abstract		21 Abstract Security Classification	
<input checked="" type="checkbox"/> unclassified/unlimited <input type="checkbox"/> same as report <input type="checkbox"/> DTIC users		Unclassified	
22a Name of Responsible Individual Lewis, P. A. W.		22b Telephone (Include Area code) (408) 646-2283	22c Office Symbol OR/Lw

DD FORM 1473, 84 MAR

83 APR edition may be used until exhausted

security classification of this page

All other editions are obsolete

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UEDIT 1.0

User's Manual

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UEDIT User's Manual

1 What is UEDIT?

UEDIT is a full-screen, scrollable spreadsheet-like editor written in the APL2 language examine data and to perform preliminary numerical analysis.

There are a great number of statistical software on the market today. The most popular programs, including *STATGRAPHICS*, *SAS*, *SPSS/PC+* and *MINITAB*, are all adept at numerical methods. However no one program has a convenient method for tabulating frequency counts, crosstabulation, aggregation of classes of frequencies and recoding of character-based categorical data. The UEDIT APL2 workspace has these capabilities and allows the user to work in a consistent way with one spreadsheet-like matrix containing all the data.

Several functions of the UEDIT workspace are not found in other statistical packages. These functions include the ability to enter new data or change existing data manually in a bulk mode or to import data from formatted or comma delimited ASCII files or, with a separate utility function, to import data files created by *STATGRAPHICS*.

The data can consist of mixed numeric and character arrays. No numerical coding of the data is needed. A facility for coding missing values is also provided. Columns of data can be easily recoded to provide more meaningful labels.

Columns, rows or blocks of data can be highlighted in a chosen color, shadowed, moved or copied.

Major-to-minor (lexicographic) sorts can be performed on selected columns, conditional and unconditional frequency tabulations and crosstabulations can be performed.

During these tasks classes of a categorical variable can be aggregated (pooled) interactively. This is an important part of contingency table analysis, and no other statistical package provides the facility for doing this which is found in UEDIT. The contingency table analysis is performed automatically after each aggregation step.

In addition, APL functions can be executed within the UEDIT environment using the data or parts of the data as input or output.

All output is obtained as a new spreadsheet, or equivalently as an APL2 matrix, which is overlaid over the original data and can be edited in the usual way. In particular two-way cross-tabulations of multiple columns are laid out in the spreadsheet like draftsmen's plots to facilitate investigation and explanation of multivariate categorical data.

Flexible printing of arrays is provided, including page headings and the ability to restrict the printout to certain blocks of the data.



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2 System Requirements

UEDIT is a workspace for IBM's APL2/PC which will run on any IBM-compatible microcomputer with at least 512 KB RAM. However, due to the memory limitations of DOS and the size of UEDIT a database should not contain more than approximately 1000 fields on a machine with full 640 KB RAM. The maximum which can be processed depends on the contents of the fields. Therefore it is recommended for moderately large or large databases that one run the program on an 80386/80387 computer under APL2/32. This APL2 interpreter utilizes all available memory in the machine up to 16 MB.

The program will operate with almost any monochrome or color video adapter with an appropriate monitor. UEDIT supports the EGA 3-line mode and the VGA 50-line mode. To print matrices a printer supported by APL2 is required. A special Auxiliary Processor (AP 81) which enhances the support of printers compatible with the Hewlett Packard LaserJet is provided with UEDIT, together with two soft fonts.

The program was written using version 1.02 of APL2/32 on an 80386 based computer with 4 MB of RAM, an EGA video adapter and monitor and a Hewlett Packard LaserJet II printer.

3 Program Availability

A copy of this workspace is available from Professor Peter A. W. Lewis at the Naval Postgraduate School (Code 55Lw), Monterey, CA 93943. Please send a 5 1/4 inch or 3 1/2 inch IBM-compatible formatted disk, or send E-Mail to 1529P@NAVPGS.

4 Getting Started

Before you start APL2 you should create a subdirectory to hold data files created by UEDIT, for example with the DOS command

```
MD C:\APL2\DATA
```

This is not absolutely necessary as all files saved by UEDIT can be recognized by their file extension .UED. However, it is recommended that you keep the APL2 program files and the data files in separate directories.

Then start the APL2 interpreter with the Auxiliary Processors AP2 (Non-APL program interface), AP80 or AP81 (Printer control), AP124 (Full-screen display management), AP210 (DOS file management) and AP440 (Sound generator) and load UEDIT. If the UEDIT workspace is in the same directory as APL232, you may use a batch file containing the commands

```
APL2FONT  
APL232 AP2 AP81 AP124 AP210 AP440 )LOAD UEDIT  
APL2FONT /T
```

where APL2FONT loads/unloads the APL2 video character set.

When you have loaded UEDIT for the first time you should inspect certain global variables which contain default values that may have to be configured for your needs. Do not forget to subsequently save the workspace with the)SAVE

command to set the new defaults permanently. All of these variables can also be changed temporarily from inside the UEDIT environment. The following subsections describe the variables.

4.1 PATH

The variable *PATH* contains the default directory path to UEDIT's data directory. Use an assignment like

```
PATH='C:\APL2\DATA\'
```

to set the path to your needs. Note that the path assignment must be finished with a backslash. All spreadsheets created in UEDIT and saved with (F2) or (Shift-F2) (see page 11) will be saved in this directory with a file extension ".UED".

4.2 MISSAN

To display a "missing numeric value" (unknown attribute) as a blank field it is necessary to assign a special numeric value to the appropriate field which is unlikely to occur in a database. By default UEDIT uses -32768. To change this value assign a new value to *MISSAN*, e.g.,

```
MISSAN=-99999
```

This can also be done with UEDIT's function (Ctrl-F9) (see page 15).

4.3 PRINT

The variable *PRINT* is a 7-element vector containing default parameters for printouts of matrices. See page 20 for a detailed discussion of these values.

4.4 DATE

Dates are stored as number of days since February 29, 0000, and displayed in the form MM-DD-YYYY by default. The display order can be changed by changing the global variable *DATE* which contains a 3-element vector where YYYY corresponds to 1, MM to 2, DD to 3. Thus the default value of *DATE* is 2 3 1. To change to a European style date display DD-MM-YYYY you would assign

```
DATE=3 2 1
```

5 Running UEDIT

To edit an APL2 array *MATRIX* start your UEDIT session with the command

```
UEDIT 'MATRIX'
```

UEDIT then performs the following steps

1. If a file *MATRIX.UED* exists in the data directory, UEDIT reads the matrix and its parameters from this file.
2. Otherwise, if an array *MATRIX* exists in the active workspace UEDIT starts the session with this matrix, creating new format and attribute parameters.
3. Otherwise UEDIT creates a new array *MATRIX* and prompts for a vector of column formats (see below).

You can start a program with

```
UEDIT ''
```

In this case the program goes immediately to the File Operations menu (see page 11) to allow the import of a comma delimited or formatted DOS file.

6 Column Formats

The following codes are valid for defining new columns or changing column types.

- A Standard APL numeric format
- N x Numeric with x decimals
- E x Scientific format; the mantissa is displayed with x decimals
- C Character format
- D Date format

All column widths are set dynamically depending on the largest field in each column. Note also that the number of decimals is only significant for screen and printer output. Internally all numbers are stored at their full APL2 accuracy.

For example, to create a new matrix which will consist of the columns "Name", "Day of Birth", "Years of Service", "Salaries" you would respond to the prompt for new column formats with

```
C,D,A,N2
```

Note that the elements are separated by commas.

UEDIT always displays the current formats below the matrix columns. An identifier C, N or D representing character, numeric or date data, respectively, is followed by the total column width. If a numeric column has a fixed decimal format, a period with the number of decimals is added. Thus for the example above the display may show

```
C6   D8   N2   N7.2
```

7 Moving Around

When you edit a matrix for the first time the cursor will be located in the first field of the matrix, i.e., in the upper left corner. The cursor position is always one complete field indicated by an inverse video display. When you save your work the cursor position is also saved so that you can resume editing at the position where you stopped.

To move the cursor and the editor window around, several key combinations are available:

1. The cursor keys ($\leftarrow \rightarrow \uparrow \downarrow$) move the cursor one field into the appropriate direction as long as the matrix borders are not yet reached. If necessary the editor window will scroll into the opposite direction to show the new active field.
2. To scroll the matrix by one field within the editor window use $\langle \text{Ctrl}-\leftarrow \rangle$ and $\langle \text{Ctrl}-\rightarrow \rangle$ for horizontal moves or $\langle \text{Ctrl}-\text{PgUp} \rangle$ and $\langle \text{Ctrl}-\text{PgDn} \rangle$ for vertical moves.
3. To scroll the matrix up or down one full window at a time use the $\langle \text{PgUp} \rangle$ and $\langle \text{PgDn} \rangle$ keys. To scroll one window to the left and right use $\langle \text{Tab} \rangle$ and $\langle \text{Shift}-\text{Tab} \rangle$.
4. To position the cursor on the matrix edges press $\langle \text{Home} \rangle$ for the first and $\langle \text{End} \rangle$ for the last column, $\langle \text{Ctrl}-\text{Home} \rangle$ and $\langle \text{Ctrl}-\text{End} \rangle$ for the first and last row, respectively.
5. If you want to locate the cursor in a specific field hit $\langle \text{Ctrl}-\text{L} \rangle$. UEDIT will prompt you for the row and column number and position the cursor in that field scrolling the window if necessary.

Reminders of these key combinations are also available on UEDIT's on-line help screens.

8 Data Input and Modification of Data using APL2 Commands

The default keyboard layout is "APL mode" which makes several ASCII characters inaccessible in the usual way. To switch the layout to the normal "ASCII mode" (typewriter keyboard) hit $\langle \text{Ctrl}-\text{Backspace} \rangle$ or $\langle \text{Alt}-\text{Backspace} \rangle$. These key combinations are toggles, i.e., they take you back and forth between the two modes every time you hit them.

When you want to enter a value for the active field, i.e., the field displayed in inverse video, just start typing. Any key which does not invoke a special editing function will be recognized as the first character of a new value for the active field. The "input line", which is the third line from the bottom, is then activated — the color changes to high intensity — and it will accept further input until the $\langle \text{Enter} \rangle$ key is hit. The new value is written into the matrix, the display updated and the input line is closed.

If the active field has a numeric type you can input an expression which has a numeric scalar as its result. Elements of the current matrix can be accessed in this input in several ways: UEDIT works with a copy *MAT* of the original matrix. Thus any element of the current matrix can be used with *MAT*[*i*;*j*] where *i* and *j* are the row and column indices, respectively. A short-cut notation for

the element at the cursor position is α . A synonym for a vector of all marked elements of the matrix is ω (see page 9). For example, to double the value of the active cell (in a numeric column, of course) you can type

$2 \times \alpha$

After the (Enter) key is hit the value in the cursor position is doubled. To add the elements of column 1 and assign the sum to the active field you would type

$+ / \text{MAT}[;1]$

followed by (Enter). For additional examples see the section on marking and highlighting of areas (page 9) and the description of function key (Ctrl-F4) (page 13).

To change a field hit (Enter). This will copy the field content to the activated input line and you can edit it by overwriting or inserting characters — use the (Ins) key to toggle between overwrite and insert mode.

Additional keystrokes recognized during the data input are:

- (Home) which locates the cursor at the beginning of the input line,
- (End) which locates the cursor at the end of the line and
- (Escape) which cancels the input, i.e., terminates the input but leaves the field unchanged.

Many functions of UEDIT allow data vectors as input. To separate the elements of a vector you should for consistency always use commas, although very often blanks are also accepted as valid delimiters. If a vector element contains a comma itself enclose the element in double quotes (") if your keyboard layout is set to ASCII mode, or in diereses (¨) if you are working in APL mode.

9 Input of Dates

Dates are internally stored as number of days since February 29, 0000¹. This allows computations to be performed on a matrix column defined as dates.

Valid date specifications in input mode are (assuming the default order of month-day-year as given by the variable *DATE*)

MM-DD-YYYY
MM/DD/YYYY
MM.DD.YYYY
MM DD YYYY

You can omit the year. In this case UEDIT will insert the current year which is taken from the DOS system date. If you enter the year with only two digits the current century will be inserted.

Every input is checked for validity. This means, invalid dates like 2-29-1990 or 00-00-1990 will be rejected, and you will be prompted for a correction.

¹ This base was chosen because it makes the conversion between internal and display format easy and fast.

10 Marking and Highlighting of Matrix Areas

Marking and highlighting of matrix cells are similar actions but with a different philosophy. While marking is used as a preparation for a several editing functions, e.g., to copy, move, print or rotate matrix areas, highlighting is used to emphasize the contents of matrix fields. UEDIT will highlight matrix fields by itself during crosstabulations.

The term "marked area" (or "highlighted area") denotes the smallest submatrix of the original matrix where each row and each column contains at least one marked (highlighted field). That is, it is the original matrix with all rows and columns removed which have no marked or highlighted fields. Note that this area may contain fields which are not marked or highlighted.

10.1 Marking

To prepare certain fields for editing actions use the following key combinations. The marking is indicated by a different background color and a blinking "M" in the upper left corner of the screen. This is useful as a reminder if the marked fields are scrolled off the screen.

- Ctrl-F Mark a single field**
Marks the field at the current cursor location. The function works as a toggle, i.e., you can hit (Ctrl-F) again to unmark the field. It also defines the first corner of a marked block (see the next item).
- Ctrl-B Mark a block**
Defines the second corner of a block to be marked. The first corner was fixed the last time (Ctrl-F) was hit. All fields within the rectangular area defined by the two opposite corners will be marked.
- Ctrl-R Mark a row**
Marks all fields in the row defined by the current cursor location.
- Ctrl-C Mark a column**
Marks all fields in the column defined by the current cursor location.
- Ctrl-U Unmark**
Removes all marking information from the matrix.

After you have marked one or more fields of the matrix you can use the symbol ω as a short-cut notation for a vector of these fields. This vector is built in row-major order. That is, when you have marked the fields $MAT[1;1]$, $MAT[1;3]$, $MAT[2;1]$ and $MAT[2;2]$, you have implicitly assigned

$$\omega \sim MAT[1;1], MAT[1;3], MAT[2;1], MAT[2;2]$$

For example, if these four fields contain numbers, you can add the first three elements, divide the sum by the last field and assign the result to the active field by typing

$$(+/3\uparrow\omega)+\omega[4]$$

as a new data input. More examples can be found in the description of function key (Ctrl-F4) (page 13) and in the Sample Session.

10.2 Highlighting

Six levels of highlighting are available, indicated by different high-intensity foreground colors and a blinking "H" in the upper left corner of the screen. The level of the normal display is 0. You can always change the levels by assigning a new level. The functions are similar to those used for marking and are defined as follows ("Sh" denotes the Shift key).

- Sh-0...6 Highlight a single field**
Highlights a single field in the matrix and assigns a (color) level of 0, ..., 6 to the field. It also defines the first corner and the color level of a highlighted block. Highlighting to level 0 is the same as removing the highlight information. For consistency with the marking syntax (Sh-F) is available which will prompt you for a color level.
- Sh-B Highlight a block**
Fixes the second corner of a block and highlights this block in the color given by the first corner.
- Sh-R Highlight a row**
Highlights all fields in the row defined by the current cursor location. You will be prompted for the color level.
- Sh-C Highlight a column**
Highlights all fields in the column defined by the current cursor location. You will be prompted for the color level.
- Sh-U Unhighlight**
Removes all highlighting information from the matrix. To unhighlight only certain areas of the matrix use the functions above and assign color level 0.
- Sh-S Shadowing**
This option asks for a color level and then hides all rows and columns which contain only fields below that level. The newly created matrix (including the column and row labels) is overlaid over its "parent" matrix and can be edited in the same way. To return to the original matrix use "Quit" (F3) or "File" (F4) (see page 12). When you use (F4) all changes are entered into the parent matrix.

11 UEDIT Functions

Once the session is started the whole range of UEDIT's functions can be accessed using certain keys or key combinations. In the following descriptions a "S-" denotes the (Shift) key, "C-" the (Control) key, i.e., (S-F10) means to hold down the (Shift) key while pressing (F10).

F1 Help

This function displays three pages of on-line help. The pages contain short reminders of the definitions of all function keys and the description of the cursor movement keys. Use (PgDn) and (PgUp) to see all pages.

S-F1 Sort

Sorts the rows of the matrix simultaneously on any number of columns in major-minor order. The sorting on character columns is performed lexicographically and is case-insensitive, i.e., lower and upper case entries are equivalent. The normal sort order is ascending. To sort descending enter the column numbers with a negative sign. For example, when you enter the column numbers to sort on as

1, -5, 10

UEDIT first sorts on column 10 in ascending order, then in descending order on column 5, and finally on column 1 (the most significant) in ascending order. Another example is described in the Sample Session. When you sort the rows of a frequency table the cumulative frequencies will be updated automatically.

C-F1 Refresh

If by some unexpected action the screen becomes fragmented use this function to restore the the correct display of the worksheet.

F2 Save

Saves the edited matrix into a file of the same name (limited to the first eight characters) and the file extension .UED and places this file in the data directory as indicated by the global variable *PATH*. A copy of the matrix is kept as a global variable in the active workspace. Matrix attributes (column formats, highlighting and marking information) are also saved in this file. The editing session continues.

S-F2 Save As...

Performs the same action as the "Save" function (F2) but prompts for a new matrix/file name. This action allows the user to save a matrix under different names in several stages of the editing process. When the session continues the newly assigned name is the default name.

C-F2 File Operations

This option displays a submenu of available functions to import or export files. Note that the export operations do not save matrix attributes, e.g. marked areas. Presently the following file formats are supported:

1. Read/Write formatted ASCII files — All fields in a data column have equal widths padded with blanks if necessary. UEDIT will prompt for the column widths before it reads such a file as there is no way to safely determine them. When it writes a formatted file adjacent columns will be separated by two blanks.

2. Read/Write comma separated files — The fields of a record are delimited by commas. Trailing blanks in a field are not necessary. A field which contains a comma must be enclosed in double quotes ("). This format is supported by most commercial database and spreadsheet programs. It is also the fastest way to import a file into UEDIT. Note that *STATGRAPHICS* can only read comma separated files but not write to them.
3. Export to *GRAFSTAT* — As *GRAFSTAT/PC* has not yet been released by IBM only a basic export capability is provided presently. This will write a matrix column as a variable into the active workspace. The variable will be a vector if the column has numeric format, otherwise it will be a two-dimensional character matrix with one element per row. It can be used as an input to the user's own APL2 functions, unless the user wants to execute them on the command line (see below under (C-F4)).
4. Export to *StatXact* — This function writes one or more matrix columns to a DOS file which can be imported into *StatXact*. Line numbers are added automatically by UEDIT. Note that *StatXact* will accept only numeric data and its import capability is limited to samples of up to 200 records and 2×2 contingency tables.

F3 Quit

Exits the current editing session without saving the matrix. If the matrix has been changed since the start of the session or the last "Save" (F2) or "Save As" (S-F2) operation you will be prompted to confirm the termination.

S-F3 Put

Saves a marked area of the matrix (see page 9) including row and column labels into a new APL2 matrix in the active workspace. This function will not write to disk.

C-F3 Get

Inserts or overlays another APL2 matrix from the active workspace into the currently edited matrix. UEDIT will ask whether to insert new rows or columns or to overlay an existing area of the matrix. If you choose to insert rows the shape of the added matrix will be adjusted, i.e., if the new matrix has less columns than the current matrix it will be padded with empty ("missing") columns, if it has more columns the excess columns will be truncated. The corresponding actions are taken when you choose to insert new columns. When you want to overlay the new matrix over the current one the position of the cursor determines the upper left corner of the overlay area. The same adjustments as for insertions are made if necessary.

F4 File

Saves the edited matrix into a file of the same name (limited to the first eight characters) and the file extension .UED and places this file in the data directory as indicated by the global variable *PATH* and terminates the editing session. Matrix attributes (column formats, highlighting and marking information) are also saved in this file. A copy of the matrix is held as a global variable in the active workspace.

S-F4 New Matrix

Starts a new editing session with a different matrix without leaving the UEDIT environment. This is the same as "Quit" (F3) and then typing *UEDIT 'NEW-MATRIX'* in the APL2 environment.

C-F4 APL command

This function allows the user to submit any valid APL2 command. It is a simple way to implement additional functions into the UEDIT workspace. Elements of the current matrix can be accessed as described before: any element of the matrix can be used with $MAT[i;j]$ where i and j are the row and column indices, respectively. A short-cut notation for the element at the cursor position is α . A synonym for a vector of all marked elements of the matrix in row-major order is ω . For instance, assume you have marked a number of numeric fields anywhere in the matrix. To add these values and assign the sum to the field at the cursor position use the command

$\alpha \leftarrow +/\omega$

To add 1 to each of the marked elements you may use

$\omega \leftarrow \omega + 1$

You should not use functions which display a result on the screen as the location of the output is unpredictable and will be overwritten by UEDIT immediately. To display results which will not become elements of the matrix a utility function *SHOW* is included in the UEDIT workspace. To display the current value of the variable *PATH* simply type

SHOW PATH

and return to the editor session by hitting the (Return) key. If, for example, you want to add the first ten integers you can type

SHOW +/10

to see the result.

To display another matrix, say *NEWMATRIX*, on the screen you can give the command

USER 'NEWMATRIX'

This command calls UEDIT recursively and overlays *NEWMATRIX* over the existing matrix. Note that the name of the matrix must be enclosed within quotes. You can edit *NEWMATRIX* like any other matrix. When you terminate this session by hitting (F3) or (F4), UEDIT takes you back to the original matrix.

As the number of possible commands is nearly unlimited, the only message in case of an error is that UEDIT will display the message "Invalid Input". The command is displayed again on the input line with α and ω expanded to their actual meaning, and you have the chance to correct your input.

For additional examples see the Sample Session.

F5 Statistical Functions

This option displays a submenu of the available statistical functions. These are described on page 16.

S-F5 Toggle Column Labels

Converts the first matrix row to column labels if no column labels exist. Otherwise it adds the existing column labels as a new first row to the matrix. When a new matrix is imported UEDIT guesses whether the first row and first column contain labels or not. If UEDIT's assumption is wrong use this function or "Toggle Row Labels" (S-F6) to correct the mistake.

C-F5 Edit Column Labels

This function lets you edit existing column labels or create new labels if none exist. It works in bulk mode (see the next function) starting with the first column. When all desired changes are made you may stop by hitting the "Escape" key.

F6 Bulk mode

The bulk mode option allows the user to manually add or insert new rows or columns into the current matrix. UEDIT first prompts for row- or column-wise input. For row-wise input the following actions take place (the equivalent holds for column-wise input): A new row is inserted into the matrix before the current cursor position, the cursor is located in the first field of this row and a prompt is displayed to enter a value for this field. Each time you hit (Enter) the cursor changes to the next field to the right and again waits for input. If the row is filled a new row is created below the last one and the process starts over. Hit the (Escape) key to leave this mode.

Note that data which exceed the current column widths will appear truncated on the screen during the input. This improves the speed with which UEDIT can handle the input and stops the input flow from being interrupted. After completion of the input the necessary column widths are recalculated and the display is updated.

S-F6 Toggle Row Labels

Converts the first matrix column to row labels if no row labels exist. Otherwise it adds the existing row labels as a new first column to the matrix. When a new matrix is imported UEDIT guesses whether the first column and first row contain labels or not. If UEDIT's assumption is wrong use this function or "Toggle column Labels" (S-F5) to correct the mistake.

F7 Insert Row

Inserts a new empty row before the current cursor location.

S-F7 Insert Column

Inserts one or more empty columns before the current cursor location. You will be prompted for the formats of the new column. See page 6 for a description of valid formats.

C-F7 Change Column Format

Lets you change the format of the column the cursor is currently located on. You will be prompted to specify the new format. See page 6 for a description of the format codes. Note that only valid changes will be accepted. For example, a numeric column can always be changed to character format, but a character-type column can only be converted to numbers if all fields can be interpreted as numbers.

F8 Search

This function searches for the next occurrence of a specified number or character string. Substrings (even in numbers) will be found too. The search, which is case-sensitive, is performed in row-major order starting at the current cursor position. The function does not "wrap around" the end of the matrix. Therefore, in order to locate all occurrences of the search object you should start in the upper left corner of the matrix.

S-F8 Recode

This function is especially useful when you have imported data from a system which can handle only numeric data, thus requiring that character type attributes are coded with numbers. With this function it is easy to recode such a matrix column to its original or any other desired attribute. UEDIT will display each distinct value of that column and prompt for a new attribute. If you want to change only a few values you can terminate this function with (Escape) after all necessary changes have been made.

C-F8 Rotate

To edit a matrix it may sometimes be easier to transpose the matrix, i.e., turn rows into columns and columns into rows, and in addition hide matrix areas you do not need. "Rotate" creates a new matrix containing the transpose of the original matrix if no area is marked or of a marked area of the matrix. The new matrix is overlaid over its "parent" matrix and can be edited in the same way. To return to the original matrix use "Quit" (F3) or "File" (F4). With (F4) all changes are entered into the parent matrix.

F9 Copy

Copies a marked row or column block to a new position which is indicated by the current cursor position. Note that the block is inserted before the current row or column. Presently this function will only copy blocks which cover all rows or all columns. To copy smaller areas use the "Put/Get" combination (S-F3), (C-F3).

S-F9 Move

Moves a marked row or column block to a new position which is indicated by the current cursor position. This is essentially the same operation as "Copy" but the marked block will be deleted from its original position.

C-F9 Change "Missing Value"

This option provides an easy way to change the numeric "Missing Value", i.e., the code assigned to unknown numeric data. The display will be updated immediately after the change.

F10 Delete Row(s)

This function deletes marked rows or the current row if no rows are marked. You will be prompted for confirmation before any action takes place. If you have deleted rows by mistake you can still recover from that error if you have not saved the matrix since the deletion. Take the following steps to save as much of your work as possible:

1. Assuming you are editing the matrix *MATRIX*, choose function (C-F4) and issue the APL2 command

HELPMATRIX-MATRIX

This will copy the original matrix which still contains the deleted rows to a new matrix.

2. "File" the current matrix with the (F4) function.
3. Now edit *HELPMATRIX* and delete all rows except those you want to recover. "File" this matrix.
4. Restart your editor session of *MATRIX*, locate the cursor on the row where the deleted rows should be and insert *HELPMATRIX* using the "Get" function (C-F3).

S-F10 Delete Column(s)

Deletes marked columns or the current column if no columns are marked. You will be prompted for confirmation before any action takes place. See the function (F10) for recommendations for error recovery.

C-F10 Printer Functions

Displays a submenu of available printer functions. See page 20 for a description.

12 Statistical Functions

Presently there are four statistical functions implemented into the menuing system of UEDIT. All operate on one or more columns of the currently edited matrix. Function key (F5) activates a submenu which lets you choose from the functions which are described in the following sections.


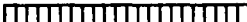

12.1 Frequency Counts with Conditionals

UEDIT prompts you for a column number on which to perform the frequency tabulation. If the column contains numeric data or dates you also have to specify three classification parameters: lower bound, upper bound and number of classes (see page 18 for details). To include only certain observations into the frequency count or to exclude certain observations you have the option of conditioning the tabulation on one or more matrix columns, including the one which is counted, as described on page 18. For example, you may want to exclude from the count the cells marked unknown.

The function then creates a new matrix overlaid over its parent in which each row contains the class label, absolute, relative and cumulative frequencies. The last matrix column displays a simple bar chart to visualize the frequencies. If all absolute frequencies are smaller than 40 then all bar lengths (measured in display columns) are equal to those frequencies. Otherwise the longest bar will be 40 columns long and the others have lengths proportional to it. The lengths are at least 1 unless there are no observations in a class.

You can edit the table like any other matrix. When you decide to sort the rows on a different criterion than the default lexicographical order the cumulative frequencies are recalculated automatically. To go back to the original table hit (F4) (File) to save the table to disk or (F3) (Quit) to exit without saving the table.

*Figure 1:
Sample
frequency
table created
by UEDIT*

	Freq.	Rel.	Cum.	
-	2	.00	2	
Female	298	.35	300	
Male	561	.65	861	

12.2 Crosstabulation with Conditionals

This option allows the user to crosstabulate any two matrix columns. Thus you will have to specify two columns at UEDIT's prompt. The handling of numeric columns and the conditioning are the same as in the case of frequency counts.

Again UEDIT creates a new table which is overlaid over the original matrix. It contains the observed absolute frequencies and the standard residuals for each field of the table. The standard residuals are highlighted at color level 1. In addition, residuals whose absolute values are larger than 1.96 or 2.54 are highlighted to level 2 and level 3, respectively, for emphasis. Thus, to see only the standard residuals, you can use the Shadow function (Shift-S) to hide the other rows and columns.

Also displayed are the row and column marginals in absolute and relative numbers. Below the table the value of the χ^2 statistic, the p -value and the number of degrees of freedom are tabulated.

To return to the parent matrix hit (F3) or (F4) as always.

Figure 2:
Sample
contingency
table created
by UEDIT

	-	Single	Married	Separated	Divorced	Widowed	total
-	.000	.000	1.000	.000	1.000	.000	2.000
-	-.145	-.978	.141	-.167	2.561	-.084	.002
Female	1.000	156.000	107.000	6.000	25.000	3.000	298.000
Female	-1.198	1.122	-1.973	.906	1.749	1.925	.346
Male	8.000	256.000	266.000	6.000	25.000	.000	561.000
Male	.882	-.760	1.429	-.651	-1.428	-1.398	.652
total	9.000	412.000	374.000	12.000	51.000	3.000	861.000
column %	.015	.479	.434	.014	.059	.004	
d.o.f.	10.000						
Chi-sq	29.581						
signif	.001						

12.3 Draftsman's Display

This function creates 2-way contingency tables for several matrix columns which are laid out internally as

$$\begin{array}{ccccccc}
 V_1 \text{ vs. } V_2 & V_1 \text{ vs. } V_3 & V_1 \text{ vs. } V_4 & \dots & V_1 \text{ vs. } V_n \\
 & V_2 \text{ vs. } V_3 & V_2 \text{ vs. } V_4 & \dots & V_2 \text{ vs. } V_n \\
 & & V_3 \text{ vs. } V_4 & \dots & V_3 \text{ vs. } V_n \\
 & & & \ddots & \\
 & & & & V_{n-1} \text{ vs. } V_n
 \end{array}$$

where V_i vs. V_j denotes the result of a crosstabulation of columns i and j .

Each table is formatted as the single tables described in the previous subsection, and you can edit each table in any way. To switch to a different submatrix hold down the (Alt)-key and hit one of the cursor keys. Note that you must release (Alt) to start the scrolling.

UEDIT chooses a temporary name for each table, which is a composite of the corresponding column labels or column numbers if no labels exist. Recall, that the name of a matrix is always displayed in the bottom row of the screen.

12.4 Aggregation

To increase cell counts and cell expectations in contingency tables you can aggregate ("pool") matrix columns or rows. Simply enter the column or row numbers in response to UEDIT's prompt or answer "O" which returns you to the original contingency table. All necessary recalculations will be performed automatically. Note that when you want to aggregate rows, you have to enter the row numbers which are displayed in the left-most column of the display. It is not necessary that the columns or rows you aggregate are contiguous.

When you are in a draftsman's display the pooling takes place only in a particular table, i.e., the other tables are not changed and can be aggregated in a total different way.

12.5 Classification of Numeric Data

If you want to do frequency counts or crosstabulations on numeric columns or on columns formatted as dates UEDIT assumes that the values are from a continuous domain. You have to enter three classification parameters:

1. the lower limit L of the first class,
2. the upper limit U of the last class and
3. the number of classes n in which to group the data.

The classes then have equal lengths $l = (U - L)/n$. Two additional classes are created to classify values below L and above U . That means $n + 2$ classes are created

$$(-\infty, L_1), [L_1, U_1), \dots, [L_n, U_n), [U_n, +\infty)$$

where $U_i = L + i \times l$ for $i = 1, \dots, n$ and $L_1 = L$, $L_j = U_{j-1}$ for $j = 2, \dots, n$. The intervals are open to the right, except for the first interval.

If the data have only a few different values (e.g., re-coded character labels) it is suggested that the user converts this column to character data (Ctrl-F7) before starting the function to emphasize their "discrete" status.

12.6 Conditional Calculations

UEDIT allows frequency counts and crosstabulations to be conditioned on *conditioning columns*, i.e., to perform the calculations only for those rows that match specific criteria. These conditioning columns can be any matrix columns including the ones which are counted.

The input of conditioning columns is a two-step process: First you enter the column numbers and their logical relationship, then you enter the conditioning criteria for each of the columns successively. A complete example is given at the end of this section.

When UEDIT prompts for conditioning columns hit (Enter) if you want all rows to be included in the operation. Otherwise enter the conditioning columns in a logical expression. For example, to include only those rows in the calculation where both column 1 and column 2 match certain criteria enter

After a syntax check you will be prompted for the criteria for each conditioning column (see below). Valid operators are

$\wedge \vee \wedge \vee \sim / () ,$

This makes a construction like

$1 \wedge (2 \vee 3 \wedge 4) \vee \wedge / 5, 6, 7$

perfectly legal although it may make no statistical sense. The most frequent application will probably be to exclude all missing values from a crosstabulation where you would use the first example, $1 \wedge 2$.

The conditioning criteria are inputted in the following way:

Character column

Enter the criteria separated by commas. For example, to include only rows where the marital status is single or married type

Single, Married

The case of your input is significant as are leading blanks. If an entry contains a comma itself enclose it within double quotes (") or diereses (") when your keyboard layout is set to APL.

To exclude certain criteria type a tilde (~) in front of the values followed by a comma, i.e., to exclude rows with a marital status single or married the correct input is

~, Single, Married

If missing values are denoted by empty (blank) fields type

~,

to exclude them.

Numeric or date column

The criteria have the form

$L_1, U_1, L_2, U_2, \dots$

where L_i and U_i define a closed interval $[L_i, U_i]$ specifying the range of values to be included or excluded. For example,

$7, 10, 15, 20, 30, 30$

includes only rows whose value in the conditioning column is in the range $[7, 10]$, $[15, 20]$ or is exactly $30 = [30, 30]$. Overlapping ranges are allowed:

$12, 20, 10, 15$

includes all rows with a value in the interval $[12, 20] \cup [10, 15] = [10, 20]$ in the calculation.

As in the case of character columns the tilde excludes certain ranges. To exclude rows with a date between February 1 and March 15, 1990 you have to type

~, 2-1-90, 3-15-90

You can omit the year in the input if you type this in 1990. When you want to include the missing values (*MISSAN*) you can abbreviate this to

~,

To summarize, assume you want to crosstabulate columns 3 and 6 of a matrix but want to exclude the missing values in both columns. Then your answers to UEDIT's prompts would be:

```
(Columns to crosstabulate:)  3,6
(Conditioning columns:)     3^6
(Criteria for column 3:)    ~,
(Criteria for column 6:)    ~,
```

13 Printer Functions

The (Ctrl-F10) key combination activates a submenu with several options. These are described in the following subsections. If you use a Hewlett Packard LaserJet II or compatible printer it is recommended that you call the Auxiliary Printer Processor AP81 on the DOS command line instead of the AP80 supplied by IBM. Note that you can always take a "snapshot" of the current screen without using the special printer functions by hitting (Shift-PrtScrn).

F1 Print worksheet

Prints the complete matrix with page numbers and headings. Matrices which do not fit on a single page are split on several continuing pages. Columns are not broken over pages. The page numbering is done in the following layout:

1.1	1.2	...
2.1	2.2	...
...

You are given the option to repeat column and row labels on each page.

F2 Print mark area

Works in the same way as "Print worksheet" but prints only a marked area of the currently edited matrix (see page 9 for a description of "marked area"). This feature is very useful and gives the user great control over the printed output.

F3 Formfeed

Sends a formfeed to the printer, i.e., ejects a page.

F4 Initialize

This function initializes the printer. The only task presently is (in the case of the AP81) to download a portrait font *AP100RFN.SFP* and a landscape font *AP100RFN.SFL* to the memory of the laser printer. You can use any fonts provided they have these names (or are renamed to them) and reside in the default directory of the default disk. UEDIT displays a warning message if it cannot find one or both fonts but does not take any further action. You have to initialize the printer only once; the fonts remain in memory until you turn off the printer.

- F5 Orientation**
Switches between portrait mode (the default) and landscape orientation. The function also exchanges the values for *textheight* and *textwidth* against each other. The menu always shows the mode you switch to when you choose this option, i.e., when you read "portrait" on the menu screen you are currently in landscape mode.
- F6 Left margin**
Specifies the blank space (in printer columns) to the left of the printer matrix.
- F7 Number of columns**
Sets the number of columns to be printed per page. Note that this number specifies the actual printer positions, usually the number of characters. It is not related to the columns of the matrix.
- F8 Top margin**
Defines the number of blank lines above the page number, which is the first line printed.
- F9 Lines per inch**
Sets the vertical spacing of the printout. The most used values are 6 and 8 lines per inch. Depending on the size of the font and the size of the worksheet to be printed you may increase or decrease the value.
- F10 Reset**
This option resets all values set with functions (F5)–(F9) to their default values which are saved in the global variable *PRINT*.

Printer Parameters

The global variable *PRINT* is a 7-element vector containing the following default values

<i>PRINT</i> [1]	11	<i>PH</i>	paper height
<i>PRINT</i> [2]	8.5	<i>PW</i>	paper width
<i>PRINT</i> [3]	0		flag portrait(0) / landscape(1)
<i>PRINT</i> [4]	10	<i>LM</i>	left margin (in printer columns)
<i>PRINT</i> [5]	80	<i>PC</i>	number of columns to print
<i>PRINT</i> [6]	3	<i>TM</i>	top margin (in lines)
<i>PRINT</i> [7]	6	<i>LPI</i>	lines per inch

For example, to make landscape printing the default mode change *PRINT* by assigning

```
PRINT[3]←8.5 11 1
```

From these parameters other necessary values can be calculated. The number of lines printed per page (*textheight TH*) is defined by

$$TH = \text{integer} \left(LPI \times \left(PH - \frac{TM}{LPI} - \frac{1}{2} \right) \right)$$

The "usable" *textheight* is *TH* minus 3 lines for the page number and the worksheet title minus 2 lines if column labels are printed.

To calculate horizontal margins in inches the "pitch" of the font must be known. The pitch is the number of characters per horizontal inch. Usual pitch values

for dot matrix printers are 10 or 12. The laser printer fonts `AP100RFW.SFP` and `AP100RFW.SFL` both print 12 characters per inch. Then the left margin LMI and right margin RMI in inches are defined by

$$LMI = \frac{LM}{\text{pitch}}$$

$$RMI = PW - \frac{LM + NC}{\text{pitch}}$$

To obtain a left margin of l and a right margin of r inches set

$$LM = l \times \text{pitch}$$

$$NC = (PW - r) \times \text{pitch} - LM$$

If you use several different printer settings regularly, you may create variables, for example `PRINT10` and `PRINT12`, and then switch between them by simply assigning

`PRINT=PRINT10`

14 Cleaning Up

When you finish your editing session you may want to save global variables you have created in a separate file or erase these objects to clean up the workspace before you start a new session. The function `CLEAN` helps you with these tasks. Simply type

`CLEAN`

on the APL2 command line. You have are given choices:

1. To erase all functions and variables which are part of the UEDIT system,
2. To erase all objects which are not part of the UEDIT system.

Respond by typing (1) or (2) followed by (Return) depending on your choice. Any other key combination will cancel the execution of this function.

If you want additional functions or variables to be recognized by the `CLEAN` function as an integral part of UEDIT, copy them into the workspace, give the commands

```
Δn12←Dtb"∘[2]⊞NL 2
Δn13←Dtb"∘[2]⊞NL 3
```

and save the UEDIT workspace.

Sample Session With UEDIT

The following sample session tries to make the user more familiar with some of UEDIT's features. Professor User of the Naval Postgraduate School currently teaches a class with 18 students. The grading for the course is based on two examinations which determine 40% and 60% of the final grade, respectively. At the beginning of the quarter he has prepared a UEDIT matrix *CLASS* with the names of the students which he uses as row labels.

After the first exam he enters the points for each student with UEDIT's bulk mode ((F6)). This allows him to enter the scores one after the other without looking up from his notes. The result after adding column labels with (Ctrl-F5) is a display as shown in Figure 3.

		1
Name		pt.1
1	Allen	78
2	Baker	73
3	Curtis	94
4	Dillon	74
5	Ellis	69
6	Field	71
7	Gould	54
8	Hayes	100
9	Jones	82
10	King	54
11	Lee	91
12	Miller	70
13	Norman	85
14	Owens	63
15	Peters	66
16	Riley	90
17	Smith	77
18	Thomas	72
		N4
Press Enter to change field values		

UEdit 1.00		CLASS [18;1]
		F1 - Help

*Figure 3:
UEDIT
display after
input of the
results of the
first exam*

points	grade
94-100	A
87-93	A-
80-86	B+
73-79	B
66-72	B-
59-65	C+
52-58	C

Professor User has a standard scheme to translate points, which always have 100 as a maximum, into grades. Therefore he has written a short APL2 function *GRADE* which allows him to do the conversion efficiently:

```
[0] R←GRADE PT
[1] R←('A' 'A-' 'B+' 'B' 'B-' 'C+' 'C')[⌊(107-PT)+7]
```

He is also interested in the ranking of the students. So he decides to add two columns to the matrix. He moves the cursor to the right of the "points" column, hits (S-F7) to insert columns and answers the prompt for column types with

C,A

because the grades have character type but the ranks are numbers. Both tasks take column 1 as input. So he marks column 1 by moving the cursor into it and hitting (Ctrl-C). This allows him to use ω as a short-cut notation for $MAT[;1]$. Then he uses UEDIT's feature to enter arbitrary APL2 commands ((Ctrl-F4)) twice and assigns, on the command line,

```
MAT[;2]←GRADE ω
MAT[;3]←Δ▽ω
```

This inserts the grades into column 2 and the ranks into column 3 as shown in Figure 4. He unmarks column 1 ((Ctrl-U)) and files the matrix with (F4).

	1	2	3
Name	pt.1	gr.1	rank
1 Allen	78	B	7
2 Baker	73	B	10
3 Curtis	94	A	2
4 Dillon	74	B	9
5 Ellis	69	B-	14
6 Field	71	B-	12
7 Gould	54	C	17
8 Hayes	100	A	1
9 Jones	82	B+	6
10 King	54	C	18
11 Lee	91	A-	3
12 Miller	70	B-	13
13 Norman	85	B+	5
14 Owens	63	C+	16
15 Peters	66	B-	15
16 Riley	90	A-	4
17 Smith	77	B	8
18 Thomas	72	B-	11
	N4	C4	N4
Press Enter to change field values			
UEDit 1.00 CLASS [18;3] F1 - Help			

Figure 4:
UEDIT
display after
adding grades
and ranks

After the second examination, Professor User deletes the ranking column with function (S-F10). Again he uses the bulk mode to enter the points for the second exam and then converts them to grades with his *GRADE* function. He adds two more columns to the matrix, which will contain the course points and course grade, and fills these columns with the APL2 command

```
MAT[;6]←GRADE MAT[;5]←MAT[;1 3]×.4 .6
```

This gives him the display of Figure 5.

	1	2	3	4	5	6
Name	pt.1	gr.1	pt.2	gr.2	points	grade
1 Allen	78	B	77	B	77.4	B
2 Baker	73	B	71	B-	71.8	B-
3 Curtis	94	A	98	A	96.4	A
4 Dillon	74	B	54	C	62.0	C+
5 Ellis	69	B-	79	B	75.0	B
6 Field	71	B-	74	B	72.8	B
7 Gould	54	C	55	C	54.6	C
8 Hayes	100	A	88	A-	92.8	A-
9 Jones	82	B+	89	A-	86.2	A-
10 King	54	C	62	C+	58.8	C+
11 Lee	91	A-	92	A-	91.6	A-
12 Miller	70	B-	81	B+	76.6	B
13 Norman	85	B+	78	B	80.8	B+
14 Owens	63	C+	70	B-	67.2	B-
15 Peters	66	B-	66	B-	66.0	B-
16 Riley	90	A-	92	A-	91.2	A-
17 Smith	77	B	83	B+	80.6	B+
18 Thomas	72	B-	80	B+	76.8	B
	N4	C4	N4	C4	N6.1	C5
Press Enter to change field values						
<div> <div>UEdit 1.00</div> <div>CLASS [18;6]</div> <div>F1 - Help</div> </div>						

Figure 5:
UEDIT
display after
calculating the
final scores

To rank the students he chooses to sort the rows of the matrix according to the points of column 5. In the case of equal numbers he wants the points of the second examination (column 3) to be the criterion for a higher rank. Therefore he starts the sorting with (S-F1) and responds to UEDIT's prompt for column numbers

-5,-3

This will show him the students in descending order of their points, i.e., the best student's name is listed in the first row, as shown in Figure 6.

	1	2	3	4	5	6
Name	pt.1	gr.1	pt.2	gr.2	points	grade
1 Curtis	94	A	98	A	96.4	A
2 Hayes	100	A	88	A-	92.8	A-
3 Lee	91	A-	92	A-	91.6	A-
4 Riley	90	A-	92	A-	91.2	A-
5 Jones	82	B+	89	A-	86.2	A-
6 Norman	85	B+	78	B	80.8	B+
7 Smith	77	B	83	B+	80.6	B+
8 Allen	78	B	77	B	77.4	B
9 Thomas	72	B-	80	B+	76.8	B
10 Miller	70	B-	81	B+	76.6	B
11 Ellis	69	B-	79	B	75.0	B
12 Field	71	B-	74	B	72.8	B
13 Baker	73	B	71	B-	71.8	B-
14 Owens	63	C+	70	B-	67.2	B-
15 Peters	66	B-	66	B-	66.0	B-
16 Dillon	74	B	54	C	62.0	C+
17 King	54	C	62	C+	58.8	C+
18 Gould	54	C	55	C	54.6	C
	N4	C4	N4	C4	N6.1	C5
Press Enter to change field values						
UEDit 1.00 CLASS [18;6] F1 - Help						

Figure 6:
UEDIT
display after
sorting on
final scores

Professor User then decides to crosstabulate the grades of the two exams although he knows that this will not make much sense as there are only 18 students in his class. But he wants to become more familiar with UEDIT and uses every opportunity to gain experience with its features. So he hits (F5) to open the menu of statistical functions, chooses (F2) for crosstabulation and enters 2,4 as the columns of interest. The result is a 7×7 contingency table, shown in Figure 7. Of course, most of the observed frequencies are 0.

He decides to aggregate the scores into only three classes A, B and C by pooling (A,A-), (B,B+,B-) and (C,C+). He does this for the rows as well as for the columns of his matrix. Note that, when asked for row numbers to aggregate, he responds with "real" matrix rows, that is for example, rows 1 and 4 to pool grades A and A-. Figure 8 shows the resulting 3×3 contingency table.

Figure 7:
UEDIT
display of the
contingency
table

		1	2	3	4	5	6	7	8
		A	A-	B	B+	B-	C	C+	total
1	A	1.00	1.00	.00	.00	.00	.00	.00	2.00
2	A	2.67	.83	-.67	-.58	-.58	-.47	-.33	.11
3									
4	A-	.00	2.00	.00	.00	.00	.00	.00	2.00
5	A-	-.33	2.33	-.67	-.58	-.58	-.47	-.33	.11
6									
7	B	.00	.00	1.00	1.00	1.00	1.00	.00	4.00
8	B	-.47	-.94	.12	.41	.41	.83	-.47	.22
9									
10	B+	.00	1.00	1.00	.00	.00	.00	.00	2.00
11	B+	-.33	.83	.83	-.58	-.58	-.47	-.33	.11
12									
13	B-	.00	.00	2.00	2.00	1.00	.00	.00	5.00
14	B-	-.53	-1.05	.84	1.28	.18	-.75	-.53	.28
15									
16	C	.00	.00	.00	.00	.00	1.00	1.00	2.00
17	C	-.33	-.67	-.67	-.58	-.58	1.65	2.67	.11
18									
19	C+	.00	.00	.00	.00	1.00	.00	.00	1.00
		N5.2	N5.2	N5.2	N5.2	N5.2	N5.2	N5.2	N6.2
Press Enter to change field values									
UEdit 1.00		pt1-pt2 [24;8]						F1 - Help	

	1	2	3	4
	A	B	C	total
1 A	4.00	.00	.00	4.00
2 A	2.74	-1.49	-.82	.22
3				
4 B	1.00	9.00	1.00	11.00
5 B	-1.18	1.17	-.62	.61
6				
7 C	.00	1.00	2.00	3.00
8 C	-.91	-.52	2.12	.17
9				
10 total	5.00	10.00	3.00	18.00
11 column %	.28	.56	.17	
12				
13 d.o.f.	4.00			
14 Chi-sq	19.13			
15 signif	.00			

N5.2	N5.2	N5.2	N5.2
------	------	------	------

Press Enter to change field values

UEdit 1.00

pt1-pt2 [15;4]

F1 - Help

Figure 8:
UEDIT
display of the
contingency
table after
aggregation

After this excursion Professor User leaves the contingency table display by hitting (F3) which takes him back to the original matrix. He wants to know at least one statistical figure, the average scores of his students. He moves the cursor to column 5 and marks it with (Ctrl-C). Then he moves the cursor to the last line, i.e., to the line below the last score, types

(+/w)+pw

and presses (Enter). Note that he does not have to hit (Enter) to start entering a new value for a field. As soon as he types the left parenthesis, the input line is activated with the parenthesis as first character.

He does the same calculations for columns 1 and 3 and formats these columns so that they are rounded to one decimal, ((Ctrl-F7)). This gives him the display shown in Figure 9.

	1	2	3	4	5	6
Name	pt.1	gr.1	pt.2	gr.2	points	grade
1 Curtis	94.0	A	98.0	A	96.4	A
2 Hayes	100.0	A	88.0	A-	92.8	A-
3 Lee	91.0	A-	92.0	A-	91.6	A-
4 Riley	90.0	A-	92.0	A-	91.2	A-
5 Jones	82.0	B+	89.0	A-	86.2	A-
6 Norman	85.0	B+	78.0	B	80.8	B+
7 Smith	77.0	B	83.0	B+	80.6	B+
8 Allen	78.0	B	77.0	B	77.4	B
9 Thomas	72.0	B-	80.0	B+	76.8	B
10 Miller	70.0	B-	81.0	B+	76.6	B
11 Ellis	69.0	B-	79.0	B	75.0	B
12 Field	71.0	B-	74.0	B	72.8	B
13 Baker	73.0	B	71.0	B-	71.8	B-
14 Owens	63.0	C+	70.0	B-	67.2	B-
15 Peters	66.0	B-	66.0	B-	66.0	B-
16 Dillon	74.0	B	54.0	C	62.0	C+
17 King	54.0	C	62.0	C+	58.8	C+
18 Gould	54.0	C	55.0	C	54.6	C
19	75.7		77.2		76.6	
	N5.1	C4	N5.1	C4	N6.1	C5

Press Enter to change field values

UEdit 1.00 CLASS [19;6] F1 - Help

Figure 9:
UEDIT
display after
adding
average scores

Finally, he wants to print out the scores. He first sorts the rows back to their original order, that is, in ascending order of their names. He does that by responding with a 1 to UEDIT's prompt for the column numbers. For the printout he is not interested in the letter grades of the two exams and wants to omit columns 2 and 4 from the output. Therefore he marks columns 1, 3, 5 and 6 using (Ctrl-C), opens the printer menu with (Ctrl-F10) and chooses option (F2) which will print out only the marked area, in this case the marked columns. The printed output would then look like the one shown in Figure 10.

Name	pt.1	pt.2	points	grade
Allen	78.0	77.0	77.4	B
Baker	73.0	71.0	71.8	B-
Curtis	94.0	98.0	96.4	A
Dillon	74.0	54.0	62.0	C+
Ellis	69.0	79.0	75.0	B
Field	71.0	74.0	72.8	B
Gould	54.0	55.0	54.6	C
Hayes	100.0	88.0	92.8	A-
Jones	82.0	89.0	86.2	A-
King	54.0	62.0	58.8	C+
Lee	91.0	92.0	91.6	A-
Miller	70.0	81.0	76.6	B
Norman	85.0	78.0	80.8	B
Owens	63.0	70.0	67.2	B
Peters	66.0	66.0	66.0	B
Riley	90.0	92.0	91.2	A
Smith	77.0	83.0	80.6	B
Thomas	72.0	80.0	76.8	B
	75.7	77.2	76.6	

Figure 10:
UEDIT
printout of the
final scores

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